



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/679,850

10/06/2003

John Patrick Kaufhold

134903-1

3202

41838

7590

06/11/2007

GENERAL ELECTRIC COMPANY (PCPI)

C/O FLETCHER YODER

P. O. BOX 692289

HOUSTON, TX 77269-2289

EXAMINER

PATEL, JAYESH A

ART UNIT

PAPER NUMBER

2624

MAIL DATE

DELIVERY MODE

06/11/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/679,850	Applicant(s) KAUFHOLD ET AL.	
	Examiner Jayesh A. Patel	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-65 is/are pending in the application.
- 4a) Of the above claim(s) 24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 and 25-65 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment

1. Applicant's response to the last office action, filed 04/26/2007 has been entered and made of record.
2. Applicant's amendment has required new grounds of rejection. New grounds of rejection are therefore presented in the office action.
3. Applicant's arguments have been fully considered but are moot in view of the new ground(s) of rejection.
4. For the purpose of examination the examiner assume the Rule 1.126 for the claim numbering. As such the claim 11 will be claim 10, Claim 12 will be claim 11 and so on.
5. Claim 24 is cancelled and will not be considered in further prosecution. **(Claim 25 becomes Claim 24 as per rule 1.126.)**
6. Regarding Claim 50 the examiner assumes that the Claim is dependent on the claim 43. **(Claim 51 becomes Claim 50 as per rule 1.126)**

Claim Objections

7. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered

claims previously presented (whether entered or not). Claim # 10 is missing in between the Claims 9 and 11.

8. Claims 50 and 51 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. A claim cannot depend on the same Claim. Regarding Claim 50 the examiner assumes that the Claim is dependent on the claim 42 and Claim 51 is dependent on Claim 50. **(Claim 51 becomes Claim 50 as per rule 1.126)**

9. Claims 1- 65 are objected to because of the following informalities: For example in Claim 1 the terms **"First selected frame"** should read **"First selected undecomposed frame"** and **"Second selected frame"** should read **"Second selected undecomposed frame"** Appropriate correction is required in all the Claims where the terms are recited.

Claim Rejections - 35 USC § 112

Claims 1-65 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the

time the application was filed, had possession of the claimed invention. The word “undecomposed” in Claims 1,26 and 42 is not supported or explained in the specifications. The specification on **(Page 4 Para 0010 Lines 2-4 and Page 5 Para 0012 Lines 3-5)** recites **“first selected frame of the series of the image frames”** and does not say that the selected frame is **“undecomposed or decomposed”**. The applicant is using the negative recitation of the limitation in the Claims 1,26 and 42 to overcome the prior art references of Close. Close (US 6532380) at **(Col 6 Lines 40-46)** discloses a reference frame **(kernel)** is selected **“which may be one of the frames”** which clearly states that the first selected frame is undecomposed and not broken down into layers or portions of images. Also Close at **(Col 6 Lines 46-48)** where the optimal motion which best maps the **kernel (reference frame) to each frame (second frame)** is calculated. This shows that the second selected frame is also undecomposed and not broken down into layers. Also Close at **(Col 4 Lines 54-55 and 57-61)** discloses a **layer** to be an identifiable feature in the angiograms **(images)** and it tracks the motion of the feature **(stent with marker)** and averages the **intensities** of the feature using several images of the time series images. This shows that that the layers are individual images or frames and are undecomposed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7,9,11,14-17,21-23,25-32,34,36-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Close et al. (US 6532380) hereafter Close and further in view of Florent et al. (US 20050002546) hereafter Florent.

10. Regarding Claim 1, Close discloses a method (**Fig 1**) for locating a low contrast movable object coupled mechanically to a marker object in a series of image frames that include images of the low contrast object and the marker object, said method comprising: locating the marker object (**Col 6 Line 46**) in a first selected undecomposed frame at (**Col 6 Lines 42-46**) of the series of image frames (**Col 6 Line 37**). Close at (**Col 6 Lines 40-46**) further discloses a reference frame (**kernel**) is selected "**which may be one of the frames**" which clearly states that the first selected frame is undecomposed and not broken down into layers or portions of images. Close further disclose selecting a patch of the first selected frame as a template of the marker object (**Col 6 Lines 44-45**) and utilizing the template of the marker object to estimate a location of the marker object in a second selected undecomposed frame of the series of image frames at (**Col 6 Lines 46-48**). Close further disclose at (**Col 6 Lines 46-48**) where the optimal motion, which best maps the **kernel (reference frame with the marker)** to **each frame (second frame....)** is calculated. This shows that the second

selected frame is also undecomposed and not broken down into layers or portions of images. Close further disclose registering (**Col 6 Lines 46-48 “which best maps”**) the second selected frame with the first selected frame utilizing the estimated location of the marker object in the second selected frame (**Col 6 Lines 46-48**) and fusing (**Col 7 Lines 11-13 adding the final residual image to the vessel or guidewire layer (image or frame)**) the registered first selected frame and the second selected frame to thereby enhance the contrast of the low contrast moveable object. Although Close discloses all the elements however is silent about the word “undecomposed”. Florent at (**Pages 2, 3 Para 0021 and 0022**) discloses markers and localizing the related markers, registering the images of the moving object of interest (**marker and stent coupled images**) and fusing (**temporal integration**) on at least two images. Florent further disclose integrating pixel intensities at each pixel location in the referential images with two or more images (**undecomposed**). Florent further discloses that the method of detecting a low contrast objects processes images in real time in order to be dynamically displayed during an intervention phase at (**Page 1 Para 3 Lines 1-6**). Florent further discloses the minimization and enhancement of the noise in sequence of fluoroscopic images at (**Page 1 Para 3 Lines 6-10**). Both Close and Florent are from the same field of endeavor and are analogous art, therefore it would have been obvious for one of ordinary skill in the art at the time the invention was made to have used the teachings of Florent in the method of Close for the above reasons.

11. Regarding claim 2, Close and Florent disclose, a method in accordance with claim 1. Close further disclose wherein said registering the second selected frame with the first selected frame comprises estimating a motion of the marker object between the first selected frame and the second selected frame at **(Col 6, Lines 46-48)**.

12. Regarding Claim 3, Close and Florent disclose, a method in accordance with claim 1. Close further disclose comprising removing a background from the first selected frame prior to selecting the template of the marker object in the first selected frame at **(Col 6, Lines 60-62 and Col 7, Lines 1-7)**. Florent also disclose subtraction of background from original image sequence at **(Page 1 Para 0002 Lines 25-29)**.

13. Regarding claim 4, Close and Florent discloses, a method in accordance with claim 1. Close further disclose comprising removing a background from the second selected frame prior to utilizing the template of the marker object from the first selected frame to estimate the location of the marker object in the second selected frame at **(Col 7, Lines 1-15)**.

14. Regarding Claim 5, Close and Florent discloses, a method in accordance with claim 1. Close further disclose wherein the second selected frame is a frame

subsequent to the first selected frame, and said method further comprises utilizing the second selected frame to modify the template of the marker object at **(Col 6, Lines 51-62)**.

15. Regarding Claim 6, Close and Florent discloses, a method in accordance with claim 5. Close further disclose wherein said utilizing the second selected frame to modify the template of the marker object comprises utilizing frames acquired both before and after the second selected frame to modify the template of the marker object at **(Col 6, Lines 51-65)**. Florent also disclose at **(Page 3 Para 0027)** the modification of the marker object using the frames of images.

16. Regarding Claim 7, Close and Florent discloses, a method in accordance with claim 1. Close further disclose wherein the first selected frame and the second selected frame comprise intensities of a first image and of a second image, respectively, stored in a computer memory at **(Col 6, Lines 51-53)**. The image layer density is the pixel intensities of the images.

17. Regarding Claim 9, Close and Florent discloses, a method in accordance with claim 1. Close further disclose a method comprising removing a background from the first selected image and from the second selected image at **(Col 7, Lines 1-15)**.

18. Regarding Claim 11, Close and Florent discloses, a method in accordance with claim 9. Close further disclose wherein said removing a background comprises utilizing a linear filter at **(Col 6, Lines 48-51)**. A low pass filter can obtain the blurred image and low pass filter is a linear filter **(Col 5, Lines 37-40)**.

19. Regarding Claim 14, Close and Florent disclose a method in accordance with claim 1. Close further disclose wherein said locating the marker object in a first selected frame comprises signaling a location of the marker object utilizing a mouse click signal by selecting a kernel **(Fig 1,element 1)**. Selection of an image for processing is well known in the art. Florent also discloses this at **(Page 3 Para 0025)**. Toklu et al (US 6724915) discloses the use of a computer mouse to select the marker object in the frame at **(Col 6, Lines 23-31)**.

20. Regarding claim 15, Close and Florent disclose a method in accordance with claim 1. Close further disclose wherein said locating the marker object in a first selected frame comprises utilizing a matched filter to locate a point at which the first selected frame produces a maximum response to the matched filter at **(Col 6, Lines 42-54)**.

21. Regarding Claim 16, Close and Florent disclose a method in accordance with claim 1. Close further disclose wherein said utilizing the template of the marker object to estimate a location of the marker object in a second selected frame

comprises correlating the template of the marker object with the second selected frame in either a spatial or a Fourier domain at **(Col 6, Lines 48-51 and Col 8, Lines 19-23)**.

22. Regarding Claim 17, Close and Florent disclose a method in accordance with claim 1. Close further disclose wherein said utilizing the template of the marker object to estimate a location of the marker object in a second selected frame further comprises utilizing prior marker object locations to estimate the location of the marker object in the second selected frame **(Col 6, Lines 40-65)**.

23. Regarding Claim 21, Close and Florent disclose a method in accordance with claim 1. Close further disclose wherein said utilizing the template of the marker object to estimate a location of the marker object in a second selected frame of the series of image frames comprises locating two marker objects and fitting a portion of a connecting member between the two marker objects with a spline at **(Col 6, Lines 59-62)**. The steps S1-S4 are repeated with a new kernel shows that there are two marker selected. Florent also discloses **(Page 4 Para 0027, 0028 and 0029)** the use of two markers and the connecting member.

24. Regarding claim 22, Close and Florent disclose a method in accordance with claim 1. Close further disclose wherein said registering the second selected frame with the first selected frame utilizing the estimated location of the marker

object in the second selected frame comprises regriding at **(Col 6, Lines 48-51)**. Regriding is done by translation and rotation.

25. Regarding Claim 23, Close and Florent disclose a method in accordance with claim 1. Close further disclose wherein said registering the second selected frame with the first selected frame utilizing the estimated location of the marker object in the second selected frame comprises a translation and a rotation at **(Col 6, Lines 40-51)**.

26. Regarding claim 25, Close and Florent disclose a method in accordance with claim 1 wherein said fusing the registered first selected frame and the second selected frame to thereby enhance the contrast of the low contrast moveable object comprises pixel wise averaging at **(Col 4, Lines 57-61)**. Florent also discloses pixel wise averaging of intensities at **(Page 3 Para 0022)**.

27. Regarding Claim 26, see explanation of claim 1. Florent also discloses the Stent on the Guidewire **(Page 3 Para 0026)**.

28. Regarding Claim 27, see explanation of Claims 26 and 2.

29. Regarding Claim 28, see explanation of Claims 26 and 3.

30. Regarding Claim 29, see explanation of Claims 26 and 4.

31. Regarding Claim 30, Close and Florent discloses a method in accordance with claim 26. Close further disclose wherein said utilizing the second selected frame to modify the template of the marker object comprises utilizing frames acquired both before and after the second selected frame to modify the template of the marker object at **(Col 6, Lines 51-65)**. Florent also disclose at **(Page 3 Para 0027)** the modification of the markers using frames.

32. Regarding Claim 31, Close and Florent discloses, a method in accordance with claim 30. Close further disclose wherein said utilizing the second selected frame to modify the template of the marker object comprises utilizing frames acquired both before and after the second selected frame to modify the template of the marker object at **(Col 6, Lines 51-65)**. Florent also disclose at **(Page 3 Para 0027)** the modification of the marker object using the frames of images.

33. Regarding Claim 32, Close and Florent discloses a method in accordance with claim 26. Close further disclose a method comprising removing an anatomical background from the first selected image and from the second selected image at **(Col 7, Lines 1-15)**.

35. Regarding Claim 34, Close and Florent disclose, a method in accordance with claim 32. Close further disclose wherein said removing an anatomical background comprises utilizing a linear filter at **(Col 6, Lines 48-51)**. A low pass

filter can obtain the blurred image and low pass filter is a linear filter (**Col 5, Lines 37-40**).

36. Regarding Claim 36, Close and Florent disclose a method in accordance with claim 26. Close further disclose wherein said locating the marker object in a first selected frame comprises utilizing a matched filter to locate a point at which the first selected frame produces a maximum response to the matched filter at (**Col 6, Lines 42-54**).

37. Regarding Claim 37, Close and Florent disclose a method in accordance with claim 26. Close further disclose wherein said utilizing the template of the marker object to estimate a location of the marker object in a second selected frame comprises correlating the template of the marker object with the second selected frame in either a spatial or a Fourier domain at (**Col 6, Lines 48-51 and Col 8, Lines 19-23**).

38. Regarding Claim 38, Close and Florent disclose a method in accordance with claim 26. Close further disclose wherein said utilizing the template of the marker object to estimate a location of the marker object in a second selected frame of the series of image frames comprises locating two marker objects and fitting a portion of a connecting member between the two marker objects with a spline at

(Col 6, Lines 40-62). The steps S1-S4 are repeated with a new kernel shows that there are two marker selected.

39. Regarding Claim 39, Close and Florent discloses a method in accordance with claim 26. Close further disclose wherein said registering the second selected frame with the first selected frame utilizing the estimated location of the marker object in the second selected frame comprises a translation and a rotation at (Col 6, Lines 40-51).

40. Regarding Claim 40, Close and Florent disclose a method in accordance with claim 26. Close further disclose wherein the second selected image is an x-ray image acquired later than the first selected image, and further comprising attempting to deploy the stent and utilizing the enhanced contrast of the stent to determine whether the stent has been successfully deployed at (Col 6, Lines 33-36).

41. Regarding Claim 41, Close and Florent disclose a method in accordance with claim 40 performed **without** injection of a contrast- enhancing bolus after the deployment of the stent means that no additional bolus is introduced.

The specifications of the claimed invention disclose at Para 13 and para15 that the stent deployment can be assessed without introduction of **an additional** bolus of contrast agent. The specification also discloses injecting contrast agent

as a reasonable practice in the stent deployment, however the administration of the contrast agent should be minimized (**Para 6**). This shows that there is already some amount of contrast agent present in the lumen. Close discloses angiographic images taken after stent expansion in the lumen filled with liquid (**contrast agent**) in abstract. Therefore it shows that the images are captured without additional injection in the lumen and whatever contrast agent is in the lumen is enough to acquire images. All of this is possible due to the image processing techniques used by Close.

Claims 8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Close, Florent in further view of an article written by Quen-Zong Wu and Bor-Shenn Jeng

42. Regarding Claim 8 and 13, Close and Florent anticipates all the limitations of Claim 1. Close also discloses the background subtraction method for detecting low contrast objects. However Close and Florent do not disclose about the first selected frame and the second selected frame comprise logarithm of intensities of a first image and of a second image, respectively, stored in a computer memory.

An article written by Quen-Zong Wu and Bor-Shenn Jeng discloses logarithmic pixel intensities for the purpose of image processing. The reference also discloses that logarithmic intensities are better than standard intensities for

background subtraction of two image frames in the following sections. Abstract **(Page1), Section 2**. Logarithmic intensities for background subtraction (Page 3), Section 3. Experimental results **(Page 6)**. By using the approach of background subtraction of logarithmic intensities of images the effects of illumination on moving object detection can be reduced and hence the sharpness and contrast can be improved as stated in **Section 2**. Therefore it would have been obvious for a person of ordinary skill in the art at the time the invention was made to use the logarithmic intensities of image frames for background subtraction as taught by Quen and Bor in the method for stent deployment as taught by Close and Florent.

Regarding Claim 13, Close and Florent anticipates all the limitations of claim 1. The method of claim 8 uses the Logarithms of intensities to achieve the background subtraction and improve the contrast. The removal of background and the contrast can be improved by many image-processing techniques. Therefore, the image processing using a square root of frame intensities of the first selected frame and the second selected frame followed by removing a background from the first selected frame and from the second selected frame is an obvious manipulation of the image processing techniques used in the invention to achieve the results.

Claims 12 and 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Close, Florent in further view of an IEEE article Vol. Com-31, No.4, April 1983 by Peter J. Burt and Edward H. Adelson

43. Regarding Claim 12, Close and Florent anticipates all the limitations of Claims 9 and 1. Close and Florent further discloses the background subtraction of the images to reduce the tracking errors. Close however does not disclose removing a background comprises interpolating the background of a coarser scale image in a Laplacian Pyramid.

The IEEE article Vol. Com-31, No.4, April 1983 by Peter J. Burt and Edward H. Adelson discloses an image processing technique using Laplacian pyramid image code. In the above method pixel-to-pixel correlations are first removed by subtracting a low pass filtered copy of the image from the image itself (**coarser scale image**). The result is net data compression since the difference, or error, image has low variance and entropy and the low pass image may be represented at a reduced density. Further data compression is achieved by quantizing the difference image. These steps are repeated to compress the low pass image. Iteration of the process at appropriately expanded scales generates a pyramid structure. Therefore, it would have been obvious to a person of ordinary skill in the art; at the time the invention was made to use the laplacian pyramid code for background subtraction of images in the coronary stent deployment for the above reasons.

44. Regarding Claim 35 Close and Florent anticipates all the limitations of Claim 32. Close and Florent further discloses the background subtraction of the images to reduce the tracking errors. Close and Florent however do not disclose removing a background comprises interpolating the background of a coarser scale image in a Laplacian Pyramid.

The IEEE article Vol. Com-31, No.4, April 1983 by Peter J. Burt and Edward H. Adelson discloses an image processing technique using Laplacian pyramid image code. In the above method pixel-to-pixel correlations are first removed by subtracting a low pass filtered copy of the image from the image itself (**coarser scale image**). The result is net data compression since the difference, or error, image has low variance and entropy and the low pass image may be represented at a reduced density. Further data compression is achieved by quantizing the difference image. These steps are repeated to compress the low pass image. Iteration of the process at appropriately expanded scales generates a pyramid structure. Therefore, it would have been obvious to a person of ordinary skill in the art; at the time the invention was made to use the laplacian pyramid code for background subtraction of images in the coronary stent deployment for the above reasons.

Claims 18, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Close, Florent in further view of Toklu et al. (US pat # 6724915) hereafter Toklu.

45. Regarding Claim 18, Close and Florent disclose a method in accordance with claim 1. Close and Florent disclose wherein said utilizing the template of the marker object to estimate a location of the marker object in a second selected frame of the series of image frames. Close and Florent however do not disclose using a Kalman filter to estimate motion of the marker object.

Toklu discloses using Kalman filter (**Col 1, Lines 46-50**). Close, Florent and Toklu have same field of endeavor, therefore it would have been obvious for one of ordinary skill in the art at the time the invention was made to combine the teachings (Kalman filter for motion tracking) as taught by Toklu to track the motion of Stent in image Guidance for coronary Stent deployment as taught by Close and Florent.

46. Regarding Claim 19, Close, Florent and Toklu anticipates all the limitations of Claim 18. Toklu disclose the use of Kalman filter in motion tracking as explained in Claim 18. Toklu also discloses the use of statistics of mean free path of the marker object to determine how much modeled motion to utilize and how much data driven motion to utilize in the Kalman filter at (**Col 7, Lines 1-44**).

47. Regarding Claim 20, Close, Florent and Toklu discloses all the limitations of Claims 18 for the use of Kalman filter in motion tracking. Toklu further discloses a method in accordance with claim 18 further comprising estimating a confidence interval on a location of the marker object at (**Col 7, lines 40-59**).

Claims 10 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Close, Florent in further view of Kim et al. (US 5793883) (hereafter Kim).

48. Regarding Claim 10, Close and Florent disclose a method in accordance with claim 9 for background removal. However, Close and Florent does not disclose removing a background comprises utilizing a local median intensity to remove the background.

Kim discloses utilizing Local Median intensity to remove the background at **(Col 7, Lines 25-45)**. The method used by Kim is directed towards preserving detail while improving the contrast. Both Close and Kim are analogous art and from same field of endeavor. Therefore it would have been obvious for a person of ordinary skill in the art at the time the invention was made to have used the method of preserving the image detail while improving the contrast as taught by Kim in image guidance and coronary Stent deployment used by Close.

49. Regarding Claim 33, Close and Florent anticipates all the limitations of Claim 32. Close and Florent also disclose a method in accordance with claim 32 for background removal. However, Close and Florent do not disclose removing a background comprises utilizing a local median intensity to remove the background.

Kim discloses utilizing Local Median intensity to remove the background at **(Col 7, Lines 25-45)**. The method used by Kim is directed towards preserving detail while improving the contrast. Both Close and Kim are analogous art and from same field of endeavor. Therefore it would have been obvious for a person of ordinary skill in the art at the time the invention was made to have used the method of preserving the image detail while improving the contrast as taught by Kim in image guidance and coronary Stent deployment used by Close.

50. Claims 43 –66 are the corresponding apparatus claims performing the methods of Claims 1-23, 25 and 26-41. Therefore see the explanations of Claims 1-23,25 and 26-41. Close discloses an apparatus in **(Figure 2)**. Close further discloses an apparatus further comprises an x-ray imager, and said image frames comprise x-ray images at **(Col 6, Lines 33-36)**. Florent also discloses an apparatus in Fig 5.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH**

shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jayesh A. Patel whose telephone number is 571-270-1227. The examiner can normally be reached on M-F 7.00am to 4.30 pm (5-4-9). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on 571-272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jayesh Patel
6/6/07
JP


JINGGE WU
SUPERVISORY PATENT EXAMINER